Ph. D. SYNOPSIS entitled as

Modern post-harvest pathological aspect of spongy tissue in different varieties of mango

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BY

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Ph.D. Synopsis/ Work plan

1. Abstract of proposed work plan/ problems:

Mango (*Mangifera indica*) is King of fruits. Mango is considered one of the most popular fruit among millions of people in the tropical area and increasingly in the developed countries. It is ranked as one of the good fruits in the international market due to its delicious taste. It is rich source of vitamin C. It is an important commercial, seasonal fruit of India and having excellent export potential. It is well-known for its typical taste and aroma.

Spongy tissue is post-harvest disease of mango. Symptoms of spongy tissue disease include development of unripe and white pulp, corky tissue with or without air pockets associated with an unacceptable off flavour in certain regions of the pulp neighbouring to the endocarp. This disorder does not show any external symptom. Spongy tissue affected fruits does not show any external symptoms and the disorder is identified only after cutting the fruit or by the non-destructive X-ray imaging technique. Spongy tissue of Alphonso (Thomas et al., 1993).So, it is not possible to externally identify the spongy tissue diseased fruits.

Spongy tissue is puzzle in plant pathology. Several researchers made attempt in the past to study exact causes of spongy tissue of mango no one can success. Spongy tissue may be nutritional, ecological or physiological and biochemical or ripening-associated disorder (Gupta et al. 1985; Katrodia, 1988; Lima et al. 2001; Raymond et al. 1998b). However Janave and Sharma (2007) reported that spongy tissue in Alphonso variety of mango may be bacterial disease and it may be caused by bacterium *S. xylosus*.

Attempts have been made in the past to detect this disease by x-ray scanning technology only in Alphonso variety but not in other varieties. To date, research on the extent of exact cause of spongy tissue and other pathological aspects are practically lacking. Considering the fact attempts have been made to investigate the exact cause and other pathological aspect of spongy tissue in Parbhani district and to detect the spongy tissue in other mango varieties by X-ray scanning technology.

2. Review of literature and development in the subject:

Nutritional, ecological, physiological and biochemical factors causes' spongy tissue (Gupta et al. 1985; Katrodia1988; Lima et al.2001; Raymond et al. 1998b). Gunjate et al. (1979) and Raymond et al. (1998) investigated spongy tissue is caused by deficiency of nutrients such as calcium. Chitarra et al. (1999) found, in spongy fruits, poor pectin-degrading activity is responsible for development of whitish pulp closer to the seed coat. Ravindra and Shivashankar (2004) reported that development of spongy tissue is closely related with the shift of the seed into germination mode. Ravindra and Shivashankar (2004) reported that cavities found in spongy fruits are to be caused due to increased respiratory activity. Janave (2006) reported that spongy tissue is bacterial disease. The development of a brownish–black colour could be caused by increased POX activity. About a twofold higher respiration rate was observed in the spongy fruits throughout the storage period compared to that in non-spongy fruits (Janave, 2007).

Yuasa (1926) found the importance of the application of X-rays in plant quarantine. Yang et al., (2006) found that early Infestations caused by Oriental Fruit Fly (*Bactroceradorsalis*) (Diptera: Tephritidae) in apple, pear, peach, cherry tomato and orange can be detected by X-ray scanning. Spongy tissue of Alphonso mango fruits can be detected by the non-destructive X-ray imaging technique (Deshpande, 2007, Janave, 2007, Janave and Sharma, 2008, Gadgile and Chavan, 2017).

3. Objectives of research:

i) To study spongy tissue disease in different varieties of mango viz. Alphanso, Pairi, Lalbagh, Totapuri, Langra, Neelum, Benishan, Kesar, Dasheri, Mallika, many local varieties etc. in Parbhani fruit markets.

ii) To investigate the exact cause of spongy tissue in mango fruits.

iii) To detect the spongy tissue by X-ray scanning technology.

4. Methodology to be adopted:

Infected fruits of different mango varieties like Alphanso, Pairi, Lalbagh, Totapuri, Langra, Neelum, Benishan, Kesar, Dasheri, Mallika and many local varieties will be collected from Parbhani fruit markets. Symptoms, exact cause and other pathological aspect will be studied by using standard pathological method. The fruits will be scanned for spongy tissue by X-ray imaging machine.

5. Importance of study/ society application:

International status: The spongy tissue has been also reported in Tommy Atkins mangoes grown in Brazil (Lima et al., 1999 and 2001), Ching Hwang mangoes grown in Taiwan (Lee et al. 2000), cv. Carbao grown in Philippines (Dasuki, 1987), mangoes grown in Malaysia (Lim and Khoo, 1985) and in Florida, USA (Kader, 2006, Paull and Chen, 2002 and Raymond et al. 1998a), and varieties Zill, Sensation and Tommy Atkins grown in South Africa (Oosthuyse, 1997).

National status: Spongy tissue disease of mango fruit has all parts of the country, as well as in other mango-growing countries. In southern parts of India,spongy tissue infected in varieties like Goamankurd, Jamadar, Vanraj, Olour, Vellaikolamben, Swarnrekha and Fernandin(Katrodia,1988).

Significance of study: This work has great application to the researchers in information technology, other research groups and academicians.After investigating the exact cause of spongy tissue we can find out the control measures of this disorder. Detection of spongy tissues by X-ray scanning non-destructive technology can be used in mango sorting system. It may be useful for traders exporting bulk quantities of exotic varieties such as the Alphonse mango.

6. Proposed work plan (Year wise plan of work and target to be achieved):

a) First year

1. Review of literature
2. Survey and collection of spongy tissue infected mango fruits of different varieties from Parbhani (M.S.) fruit market.
3. Study of incidence of spongy tissue of different varieties.

b) Second year

1. Study of symptoms of spongy tissue of different varieties.
2. Investigation of exact cause of spongy tissues.

c) Third year

1. X-scanning of spongy tissues mango fruits of different varieties.

d) Fourth year

1. Thesis writing

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Signature **Signature**

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